

Xiuquan Zhou – Curriculum vitae

Postdoctoral Researcher (with Prof. Mercouri Kanatzidis), Argonne National Laboratory, 2018 - present

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Research Interests

The synthesis of novel layered metastable materials using kinetically controlled methods such as topochemical deintercalation; characterizations of materials with functionalities relevant to superconductivity, magnetism and direct band gap; structural determination using X-ray or neutron diffractions

Education

2018/02/28 Ph.D., Chemistry (with Prof. Efrain Rodriguez)- the University of Maryland (UMD), College Park, MD

2013/03/15 M.S., Chemistry (co-advised by Prof. Cora Lind and Sanjay Khare)- the University of Toledo (UT), Toledo, OH

2007/07/01 B.S., Materials Science and Engineering - East China University of Science and Technology (ECUST), China

Computer Skills

Density functional theory (DFT) calculations, Proficiency in programming (Python, Linux bash and VB)

Awards

2018 Research Excellence Awards (\$500) and research presentation in the Department of Chemistry award ceremony, Maryland

2017 Ann G. Wylie Dissertation Fellowship (\$15800), Maryland

2016 Amit and Ruchi Mehta Graduate Research Award (\$2850), Maryland

2016 Outstanding Graduate Assistant Award, Maryland

2010 Outstanding Graduate Student Award, Toledo

2004 2nd Tier scholarship (¥1666), ECUST

Teaching and Outreach

For graduate level: lab teaching assistant (TA) for instrumental analysis

For undergraduate level: lab TA for general chemistry I; discussion class TA for general chemistry III

Outreach: demonstration of superconducting levitation and graphene exfoliation to middle school students and parents

Publications

[1] Wilfong, B.; **Zhou, X.**; Zheng, H.; Babra, N.; Brown, C. M.; Lynn, J. W.; Taddei, K. M.; Paglione, J.; Rodriguez, E. E. **Long-range magnetic order in hydroxide-layer-doped** $(\text{Li}_{1-x-y}\text{Fe}_x\text{Mn}_y\text{OD})\text{FeSe}$. *Phys. Rev. Mater.* **2020**, *4*, 034803.

[2] **Zhou, X.**; Wang, L.; Fan, X.; Wilfong, B.; Liou, S.-C.; Wang, Y.; Zheng, H.; Feng, Z.; Wang, C.; Rodriguez, E. E. **Isotope Effect between H_2O and D_2O in Hydrothermal Synthesis**. *Chem. Mater.* **2020**, *32*, 769–775.

- [3] Fan, X.; Ji, X.; Chen, L.; Chen, J.; Deng, T.; Han, F.; Yue, J.; Piao, N.; Wang, R.; **Zhou**, X.; Xiao, X.; Chen, L.; Wang, C. **All-temperature batteries enabled by fluorinated electrolytes with non-polar solvents.** *Nature Energy* **2019**, *4*, 882–890.
- [4] Deng, T.; Fan, X.; Cao, L.; Chen, J.; Hou, S.; Ji, X.; Chen, L.; Li, S.; **Zhou**, X.; Hu, E.; Su, D.; Yang, X.-Q.; Wang, C. **Designing in-situ-formed interphases enables highly reversible cobalt-free LiNiO₂ cathode for Li-ion and Li-metal batteries.** *Joule* **2019**, *3*, 2550–2564.
- [5] Virtue, A.; **Zhou**, X.; Wilfong, B.; Lynn, J. W.; Taddei, K.; Zavalij, P.; Wang, L.; Rodriguez, E. E. **Magnetic order effects on the electronic structure of KMnS₂ (*M* = Cu, Li) with the ThCr₂Si₂-type structure.** *Phys. Rev. Materials* **2019**, *3*, 044411.
- [6] Deng, T.; Fan, X.; Chen, J.; Chen, L.; Luo, C.; **Zhou**, X.; Yang, J.; Zheng, S.; Wang, C. **Layered P2-Type K_{0.65}Fe_{0.5}Mn_{0.5}O₂ microspheres as superior cathode for high-Energy potassium-ion batteries.** *Adv. Funct. Mater.* **2018**, *1800219*.
- [7] **Zhou**, X.; Wilfong, B.; Liou, S.-C.; Hodovanets, H.; Brown, C. M.; Rodriguez, E. E. **Stabilization of ammonia-intercalated iron chalcogenides by hydrogen bonding.** *Chem. Comm.* **2018**, *54*, 6895–6898.
- [8] Chen, J.; Fan, X.; Ji, X.; Gao, T.; Hou, S.; **Zhou**, X.; Wang, L.; Wang, F.; Yang, C.; Chen, L.; Wang, C. **Intercalation of Bi nanoparticles into graphite enables ultra-fast and ultra-stable anode material for Sodium-ion batteries.** *Energy Environ. Sci.* **2018**, *11*, 1218–1225, DOI:10.1039/C7EE03016A.
- [9] Fan, X.; Yue, J.; Han, F.; Chen, J.; Deng, T.; **Zhou**, X.; Hou, S.; Wang, C. **High performance all-solid-state Na-S battery enabled by casting-annealing technology.** *ACS Nano* **2018**, *12*, 3360–3368, DOI:10.1021/acsnano.7b08856.
- [10] Wilfong, B.; **Zhou**, X.; Vivanco, H.; Campbell, D. J.; Wang, K.; Graf, D.; Paglione, J.; Rodriguez, E. E. **Frustrated magnetism in tetragonal CoSe, analogue to superconducting FeSe.** *Phys. Rev. B* **2018**, *97*, 104408.
- [11] Deng, T.; Fan, X.; Luo, C.; Chen, J.; Chen, L.; Hou, S.; Eidson, N.; **Zhou**, X.; Wang, C. **Self-templated formation of P2-type K_{0.6}CoO₂ microspheres for high reversible potassium-ion batteries.** *Nano Lett.* **2018**, *18*, 1522–1529.
- [12] **Zhou**, X.; Rodriguez, E. E. **Tetrahedral transition metal chalcogenides as functional inorganic materials.** *Chem. Mater.* **2017**, *29*, 5737–5752.
- [13] **Zhou**, X.; Eckberg, C.; Wilfong, B.; Liou, S.-C.; Vivanco, H. K.; Paglione, J.; Rodriguez, E. E. **Superconductivity and magnetism in iron sulfides intercalated by metal hydroxides.** *Chem. Sci.* **2017**, *8*, 3781–3788.
- [14] **Zhou**, X.; Wilfong, B.; Vivanco, H.; Paglione, J.; Brown, C. M.; Rodriguez, E. E. **Metastable layered cobalt chalcogenides from topochemical deintercalation.** *J. Am. Chem. Soc.* **2016**, *138*, 16432–16442.
- [15] **Zhou**, X.; Zhou, W.; Udovic, T. J.; Yildirim, T.; Rush, J. J.; Rodriguez, E. E.; Wu, H. **Development of potential organic-molecule-based hydrogen storage materials: Converting C N bond-breaking thermolysis of guanidine to N H bond-breaking dehydrogenation.** *Int. J. Hydrogen Energy* **2016**, *41*, 18542–18549.
- [16] Wu, H.; **Zhou**, X.; Rodriguez, E. E.; Zhou, W.; Udovic, T. J.; Yildirim, T.; Rush, J. J. **A new family of metal borohydride guanidinate complexes: Synthesis, structures and hydrogen-storage properties.** *J. Solid State Chem.* **2016**, *242*, 186–192.
- [17] **Zhou**, X.; Borg, C. K. H.; Lynn, J. W.; Saha, S. R.; Paglione, J.; Rodriguez, E. E. **The preparation and phase diagrams of (Li_{1-x}Fe_xOD)FeSe and (Li_{1-x}Fe_xOH)FeSe superconductors.** *J. Mater. Chem. C* **2016**, *4*, 3934.
- [18] Borg, C. K.; **Zhou**, X.; Eckberg, C.; Campbell, D. J.; Saha, S. R.; Paglione, J.; Rodriguez, E. E. **Strong anisotropy in nearly ideal tetrahedral superconducting FeS single crystals.** *Phys. Rev. B* **2016**, *93*, 094522.
- [19] Lynn, J. W.; **Zhou**, X.; Borg, C. K.; Saha, S. R.; Paglione, J.; Rodriguez, E. E. **Neutron investigation of the magnetic scattering in an iron-based ferromagnetic superconductor.** *Phys. Rev. B* **2015**, *92*, 060510.

- [20] Zhou, X.; Gall, D.; Khare, S. V. **Mechanical properties and electronic structure of anti-ReO₃ structured cubic nitrides, M₃N, of d block transition metals M: An *ab initio* study.** *J. Alloys Compounds* **2014**, *595*, 80–86.
- [21] Efthimiopoulos, I.; Kemichick, J.; Zhou, X.; Khare, S. V.; Ikuta, D.; Wang, Y. **High-Pressure Studies of Bi₂S₃.** *J. Phys. Chem. A* **2014**, *118*, 1713–1720.
- [22] Zhou, X.; Heinrich, C. P.; Klunker, M.; Dolique, S.; Mull, D. L.; Lind, C. **Non-hydrolytic sol-gel synthesis of tantalum sulfides.** *J. Sol-gel Sci. Technol.* **2014**, *69*, 596–604.
- [23] Liu, Z. T. Y.; Zhou, X.; Gall, D.; Khare, S. V. **First-principles investigation of the structural, mechanical and electronic properties of the NbO-structured 3d, 4d and 5d transition metal nitrides.** *Comput. Mater. Sci.* **2014**, *84*, 365–373.
- [24] Zhou, X.; Soldat, A. C.; Lind, C. **Phase selective synthesis of copper sulfides by non-hydrolytic sol-gel methods.** *RSC Adv.* **2014**, *4*, 717–726.
- [25] Liu, Z. T. Y.; Zhou, X.; Khare, S. V.; Gall, D. **Structural, mechanical and electronic properties of 3d transition metal nitrides in cubic zincblende, rocksalt and cesium chloride structures: a first-principles investigation.** *J. Phys.: Condens. Matt.* **2013**, *26*, 025404.
- [26] Zhou, X.; Roehl, J. L.; Lind, C.; Khare, S. V. **Study of B1 (NaCl-type) to B2 (CsCl-type) pressure-induced structural phase transition in BaS, BaSe and BaTe using *ab initio* computations.** *J. Phys.: Condens. Matt.* **2013**, *25*, 075401.

Workshops

The Fundamentals of Quantum Materials Winter School and Workshop (1st in 2017 and 2nd in 2018): Demonstrating and teaching hydrothermal crystal growth techniques to attendees; assistance with organizing the winter school

Conference Talks

American Physical Society Meeting (March, 2016, Baltimore, MD): Physical properties of superconducting single crystal iron sulfide

North American Solid State Chemistry Conference (Aug., 2017, Santa Barbara, CA): Topochemical intercalation and ion-Exchange of layered tetragonal chalcogenides via low-temperature routes

Conference Posters

Inorganic Discussion Weekend (Nov. 2010, Windsor, Canada): Non-hydrolytic Sol-gel synthesis of copper sulfides

North American Solid State Chemistry Conference (June, 2011, Hamilton, Canada): Non-hydrolytic sol-gel synthesis of copper sulfides

69th Pittsburgh Diffraction Conference (Nov. 2011, Cleveland, OH): Non-hydrolytic sol-gel synthesis of copper sulfides (*poster*)

North American Solid State Chemistry Conference (May, 2015, Tallahassee, FL): Bottom-up preparation of layered iron chalcogenides superconductors

American Chemical Society Meeting (April, 2017, San Francisco, CA): Topochemical intercalation and ion-exchange of layered iron chalcogenides